

Application of Fuzzy Analytic Hierarchy Process and TOPSIS Methods for Destination Selection

Hnin Min Oo, Su Hlaing Hnin

University of Computer Studies, Mandalay, Myanmar

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Destination selection is a part of decision making problems which should carefully be investigated towards choosing the best alternative among popular alternatives we have. Modeling decision-making issue structure can affect decision-making and various decision-making models impose distinct goals. This thesis is implemented by demonstrating decision making model such as FAHP, TOPSIS in destination selection. The integration between FAHP and MCDM is significant in order to serve tourist the best recommendation islands.

The decision-making process may involve three basic stages: intelligence, decision and choice. In the intelligence stage, data are gathered and analyzed. In the decision stage, the problem is studied and solutions are generated and tested. In the choice state, a solution is selected and implemented. The MCDM methods deal with the process of making decisions in the presence of multiple criteria or objectives. The technique for order preference by similarity to ideal solution (TOPSIS) is one of the well-known classical MCDM methods.

Multi Criteria Decision-Making Methods (MCDMs)

Multi-criteria decision-making methods (MCDMs) provide explicit declarations of decision-makers' preferences. Such preferences are described by different quantities, weighting scheme, constraints, objectives, utilities, and other parameters. By formally analyzing alternative options, their attributes, assessment criteria, aims or objectives, and limitations, they evaluate and support decision. MCDM often requires the decision-maker to provide qualitative

ABSTRACT

Destination selection is one of the most become an extremely popular. Sometimes the terms tourism and tourisms are used pejoratively to indicate a shallow interest in the societies or islands that traveler's tour. This system presents the use of fuzzy AHP and TOPSIS for deciding on the selection of destination as like the selection of island. In this system, eight countries that include in South-East Asia (Thailand, Singapore, Malaysia, Indonesia, Philippine, Vietnam, Cambodia, Brunei) are used. At first, the user can choose the specific country to decide the island of these countries and their preferences (attraction, environment, accommodation, transportation, restaurant, activity, entertainment and other facilities) are taken as inputs and then display the list of alternatives that matched with user's preferences. Fuzzy analytic hierarchy process is used in determining the weight of criteria and alternatives. Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method is used for determining the final ranking of the alternatives. Finally, this system shows the list of destinations depend on user's preferences.

KEYWORDS: TOPSIS method; Fuzzy AHP; destination selection; decision making methods

INTRODUCTION

Tourism is now one of the world's largest service industries. The aim of this research is to use Fuzzy Multi-Criteria Decision Making (MCDM) to assess island social characteristics.

assessments to determine (a) the performance of each alternative in relation to each criterion (b) the relative importance of the assessment criteria in relation to the overall objective of the issue. As a consequence, generally unclear, imprecise, and subjective information are provided that make the decision-making process complicated and difficult. An assessment criterion provides an indication of how well a certain goal is achieved by the alternatives. An alternative efficiency for a criterion can be evaluated in various measurement scales. There are four principal measuring levels. These levels are nominal, ordinal, interval, and ratio, varying from smallest to highest. Each level has the significance of the levels below plus extra significance. Scientific instrument measurements are often ratio scale, the quantity of measurement in most social and decision contexts depends on the subject's intention to answer a question or make a judgment [1].

Analytic Hierarchy Process (AHP)

Saaty first introduced the analytical hierarchy method (AHP) in 1971 to address the military's scarce resource allocation and planning requirements. The AHP has become one of the most commonly used multi-criteria decision-making (MCDM) techniques since its introduction and then it has been used to address unstructured issues in various fields of human requirements and interests, such as political, economic, social and management sciences. The AHP is based on human inherent capacity to make sound decisions on small issues. It supports decision-making by organizing perceptions, emotions, opinions and memories into a structure that displays the forces influencing a decision. The

AHP is implemented in the software of Expert Choice and it has been applied in a variety of decisions and planning projects in nearly 20 countries. In AHP a problem is structured as a hierarchy [8]. These hierarchical orders assist simplify the problem's illustration and take it to a more readily accepted situation. The weights of the components are calculated at each hierarchical stage. Considering the weights of criteria and options, the choice on the final objective is produced.

Fuzzy Analytical Hierarchy Process (FAHP)

The Analytic Hierarchy Process (AHP) was commonly used to fix decision-making issues with multiple criteria. However, due to vagueness and instability in the judgement of the decision-maker, a crisp, pair-wise comparison with a standard AHP may not be able to correctly capture the judgment of the decision-makers (Ayag 2005). The pair-wise comparison is created in standard AHP using a nine-point scale that transforms human preferences as similarly, moderately, heavily, very heavily or highly preferred between accessible options. Although AHP's discrete scale has the benefits of simplicity and ease of use, the uncertainty associated with mapping one's view to a number [0.77823] is not sufficient to take into consideration. AHP's purpose is to capture the knowledge of the expert, but the Normal AHP still cannot reflect the style of human thinking, so the Fuzzy AHP has been adapted to solve the hierarchical fuzzy issues (Kahraman, Cebeci et al. 2004) [STRENGTH]. Consequently, in the pair-wise comparison, fuzzy logic is implemented to address the defect in the traditional AHP [0.77823]. In 1983, Laarhoven and Pedrycz introduced the Fuzzy Analytic Hierarchy Process, a combination of Analytic Hierarchy Process (AHP) and Fuzzy Theory [EJSR]. This is called the Fuzzy AHP. The linguistic evaluation of human emotions and opinions is vague and in terms of accurate figures it is not appropriate to describe it. It is more comfortable for decision-makers to give interval decisions than fixed-value judgments. Therefore, in fuzzy AHP (Chan & Kumar 2005) [9], triangular fuzzy numbers are used to determine the priority of one choice variable over another.

The steps of this FAHP-based study are as follows:

- Determine problems: : Determine the present decision issues that need to be resolved in order to guarantee right future analyzes; this study addressed "the assessment criteria for verifying customer selection criteria".
- Set up hierarchy architecture: Determine the assessment criteria with indexes as the FAHP criteria layer. Reading literature can identify appropriate requirements and feasible systems for the choice of assessment criteria. Through FDM investigating the opinions of experts, this study screened the significant factors that conform to target issues to establish the hierarchy architecture.
- Develop matrices for pair comparison among all the elements / criteria in the hierarchy system dimensions. Assign linguistic terms to the comparisons between pairs by questioning which of the two dimensions is the most significant.

Fuzzy AHP is an effective instrument for dealing with the fuzziness of the information involved in selecting the preferences of various factors of choice. In the form of triangular fuzzy numbers, the comparisons generated by the specialist are described to develop fuzzy pair-wise matrices (Ghodsypour & O'Brien 1998). Using FAHP, we can manage

the fuzziness of the information involved in choosing the best supplier effectively. In the multi-attribute decision making problems, it can handle both qualitative and quantitative data effectively and it is easier to understand. In this strategy, triangular fuzzy numbers are used for one criterion's preferences over another, and then the synthetic extent value of the pair-wise comparison is calculated using the technique of extent assessment. The weight vectors are determined and normalized based on this strategy. As a consequence, the final priority weights of the alternative suppliers are chosen based on the distinct weights of criteria and characteristics. The supplier with the highest weight would have the greatest priority [9]. would be given to the supplier with highest weight [9].

Comparison of AHP and Fuzzy-AHP

Due to Saaty (1980), the Analytic Hierarchy Process (AHP) is often referred to as the Saaty method. The AHP's primary benefit is its capacity to rank decisions in order of their efficacy in achieving conflicting goals. The AHP's primary benefit is its capacity to rank decisions in order of their efficacy in achieving conflicting goals. It is easy to view the fuzzy AHP technique as an advanced analytical method derived from the traditional AHP. Despite AHP's flexibility in managing both quantitative and qualitative criteria for multi-criteria policy-making issues based on the assessments of decision-makers, the flexibility and vagueness involved in many decision-making issues can lead to decision-makers' imprecise decisions in standard AHP methods.

METHODOLOGY

This system is implemented to select the destination as like the island selection using Fuzzy-AHP and TOPSIS method. At first, there are eight countries (Thailand, Singapore, Malaysia, Cambodia, Brunei, Indonesia, Philippine and Vietnam) for tourists. There are seven famous islands in each country. So, many criteria are needed to consider for tourism. In this thesis, there are eight criteria that need to consider choosing the best island for tourism. Fuzzy-AHP method is used to get the weight of the islands by calculating upon these criteria. In order to incorporate uncertainties and vagueness in decision making Fuzzy Analytic Hierarchy (FAHP) approach is extended with TOPSIS approach, where different decision makers (DM's) opinion was considered for ranking the islands. Figure 1 shows the system flow diagram of this system.

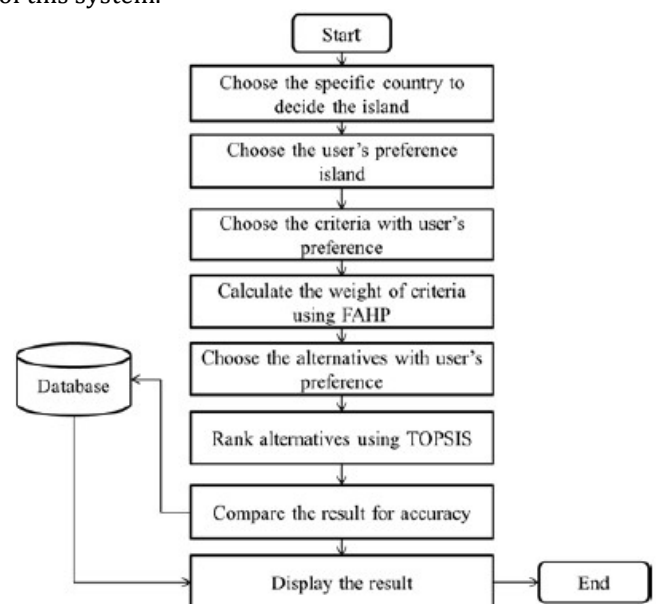


Fig. 1 System Flow Diagram

Define Criteria

The general decision making process include four steps.

1. Defining decision objectives
2. Determining feasible alternatives
3. Evaluating the alternatives
4. Select and implement the best alternative

This system uses eight criteria for decision making. They are attraction, environment, accommodation, transportation, restaurant, activity, entertainment and other facilities (C1, C2, C3, C4, C5, C6, C7, C8) respectively.

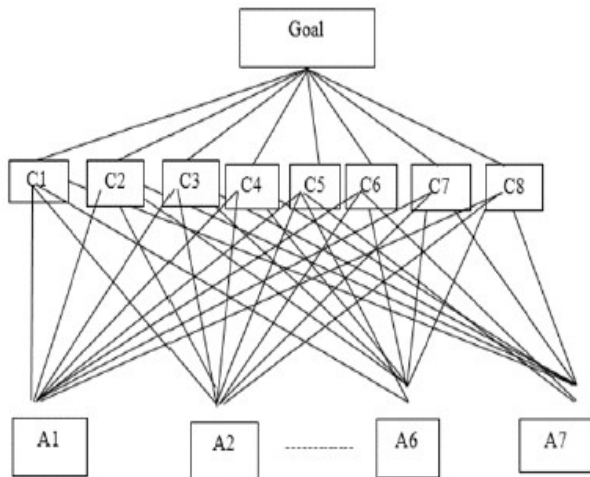


Fig.2 A Hierarchical Structure of the Oversea Island Selection

TABLE I. PAIRWISE COMPARISON OF USER'S PREFERENCE

Criteria	C1	C2	C3	C4	C5	C6	C7	C8
C1	1, 1, 1	5, 7, 9	7, 9, 9	1, 3, 5	3, 5, 7	1, 1, 3	5, 7, 9	3, 5, 7
C2	1/9, 1/7, 1/5	1, 1, 1	3, 5, 7	1, 1, 3	1, 1, 3	1, 3, 5	1, 3, 5	1, 1, 3
C3	1/9, 1/9, 1/7	1/7, 1/5, 1/3	1, 1, 1	1, 1, 3	1, 3, 5	1/7, 1/5, 1/3	1/5, 1/3, 1	1, 1, 3
C4	1/5, 1/3, 1	1/3, 1, 1	1/3, 1, 1	1, 1, 1	1, 3, 5	1/5, 1/3, 1	1/5, 1/3, 1	1, 1, 3
C5	1/7, 1/5, 1/3	1/3, 1, 1	1/5, 1/3, 1	1/5, 1/3, 1	1, 1, 1	1/9, 1/7, 1/5	1/7, 1/5, 1/3	1/5, 1/3, 1
C6	1/3, 1, 1	1/5, 1/3, 1	3, 5, 7	1, 3, 5	5, 7, 9	1, 1, 1	1, 3, 5	5, 7, 9
C7	1/9, 1/7, 1/5	1/5, 1/3, 1	1, 3, 5	1, 3, 5	3, 5, 7	1/5, 1/3, 1	1, 1, 1	3, 5, 7
C8	1/7, 1/5, 1/3	1/3, 1, 1	1/3, 1, 1	1/7, 1/5, 1/3	1, 3, 5	1/9, 1/7, 1/5	1/7, 1/5, 1/3	1, 1, 1

Step1: Establish a decision matrix for the ranking. The structure of the matrix can be expressed as follows:

$$D = \begin{matrix} & F_1 & F_2 & \dots & F_n \\ \begin{matrix} A_1 \\ A_2 \\ \dots \\ A_m \end{matrix} & \begin{bmatrix} c_{11} & c_{12} & \dots & c_{1n} \\ c_{21} & c_{22} & \dots & c_{2n} \\ \dots & \dots & \dots & \dots \\ c_{m1} & c_{m2} & \dots & c_{mn} \end{bmatrix} \end{matrix}$$

The problem can be described by following sets:

A_i denotes the alternatives i , $i = 1, 2, \dots, m$. F_j represents j th criteria, related to i th alternative; and c_{ij} is a crisp value indicating the performance rating of each alternative A_i with respect to each criteria F_j .

Step2: Calculate the normalized decision matrix. The normalized value r_{ij} is calculated as:

$$r_{ij} = \frac{c_{ij}}{\sqrt{\sum_{j=1}^J c_{ij}^2}}$$

where j denotes $1, 2, \dots, J$ and i denotes $1, 2, \dots, n$.

Constructing Pair Wise Comparison Using Eight Criteria

At first, the user needs to select the comparison between eight criteria such as equal important, moderate important, strong important, demonstrated important and extreme important. Equal important is equal to the number 1,1,3, moderate important is 1,3,5, strong important is 3,5,7, demonstrated important is 5,7,9 and extreme important is 7,9,9. According to decision maker's preferences for criteria, pairwise comparison values are transformed into TFN's as in Table 2.

The AHP only uses the pair-wise comparison matrix to evaluate ambiguity in multi-criteria decision-making problems.

Let C_1, C_2, \dots, C_n denote the set of elements, while a_{ij} represents a quantified judgment on a pair of elements C_i, C_j .

The relative importance of two elements is rated using a scale with the values 1, 3, 5, 7, and 9, where 1 denotes equally important, 3 for weak importance of one over another, 5 for essential or strong importance, 7 for very strong importance, and 9 for extremely preferred. Table 1 shows the pairwise comparison of user's preference.

Computational Procedure for TOPSIS Method

TOPSIS is one of the very simple and easy to apply Multi Attribute Decision Making methods, so it is used when the user desires a simplified weighting strategy. The TOPSIS method is expressed in a succession of seven steps as follows:

Step3: The weighted normalized decision matrix is calculated by multiplying the normalized decision matrix by its associated weights. The weighted normalized value v_{ij} is calculated as:

$$v_{ij} = w_j \cdot r_{ij}, j = 1, 2, \dots, J, i = 1, 2, \dots, n;$$

where w_j represents the weight of the j th criteria.

$$A^* = \{v_1^*, v_2^*, \dots, v_n^*\}$$

For minimum values,

$$A^- = \{v_1^-, v_2^-, \dots, v_n^-\}$$

Step5: Calculate the separation measures, using the m -dimensional Euclidean distance. The distance of each alternative from PIS and NIS are calculated.

Step4: Positive ideal solution (PIS) and negative ideal solution (NIS) are calculated as follows: For maximum values,

$$d_i^* = \sqrt{\sum_{j=1}^n (v_{ij} - v_j^*)^2}, j = 1, 2, \dots, J.$$

$$d_i^- = \sqrt{\sum_{j=1}^n (v_{ij} - v_j^-)^2}, j = 1, 2, \dots, J.$$

Step 6: Calculate the relative closeness to the ideal solution and rank the alternatives in descending order. The closeness coefficient of each alternative is calculated:

$$CC_i = \frac{d_j^-}{d_j^+ + d_j^-} \quad j = 1, 2, 3, \dots, J$$

where the index value of CC_i lies between 0 and 1. The larger the index value, the better performance of the alternatives.

Step 7: Rank preference order. By comparing CC_i values, the ranking of alternatives is determined.

Figure 3 illustrates the hierarchical structure for selecting extent travel destination and Table 2 shows the value of fuzzy synthetic extent for each criteria.

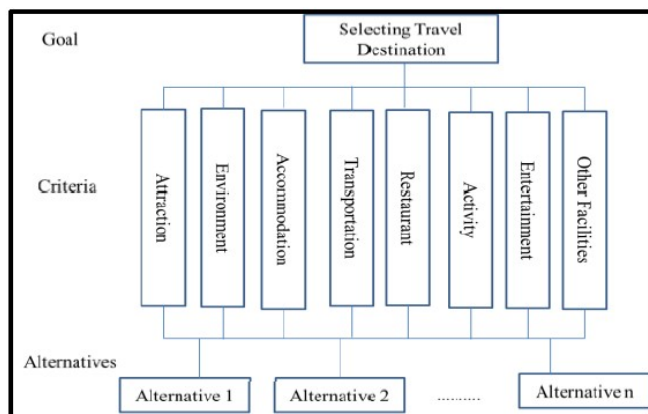


Fig. 3 Hierarchical Structure for Selecting Travel Destination

TABLE II. THE VALUE OF FUZZY SYNTHETIC EXTENT FOR EACH CRITERIA

SC1	0.1374, 0.2982, 0.6447
SC2	0.0481, 0.1189, 0.3507
SC3	0.0243, 0.0537, 0.1781
SC4	0.0331, 0.0942, 0.2321
SC5	0.0123, 0.0278, 0.49
SC6	0.0874, 0.1398, 0.3507
SC7	0.0503, 0.1398, 0.3507
SC8	0.0169, 0.0529, 0.1186

EXPERIMENTAL RESULTS

This system used 8 countries of ASEAN and 7 islands for each country. At first they chose the best island by themselves and they gave their preferences for alternatives and criteria. Accuracy was 88.58% in 11508 testing because 1314 results were false and 10194 results were true.

Sensitivity Analysis

An analysis called sensitivity is a critical section in decision making. It analyzes the effects of decision parameters on the results. Sensitivity analysis can be conducted with the three schemas. They are 1) Swapping Criteria Weight, 2) Swapping

Decision Makers' Weights, 3) Swapping both criteria and decision makers' weights concurrently. Schema 2 and Schema 3 can only be used in group decision making.

First, the weight of the first criteria is alternated or swapped case by case with the weights of the remaining criteria. In each instance of swapping the weight of the first criterion with another, the weights of all the other criteria are held constant as shown in Table 4. For this aim, different cases are obtained by changing the weights of the criteria.

In this system, a sensitivity analysis is conducted by swapping the weights of the criteria (Schema 1).

According to the testing results, from Table 5 and Figure 3, it can be seen that the first case describes the original result of the integrated methodology. For the remaining twenty eight cases, alternative (A3) has the highest priority in all cases.

In addition, the findings of the sensitivity analysis show that the ranking of the alternatives has considerably changed according to the criterion's equal weights. It can therefore be seen that this decision-making process, based on the evaluations acquired, is comparatively intensive to the weights of the criteria with A3 emerging as the winner of all the instances.

According to the testing results, from Table 4 and Figure 4, it can be seen that the first case describes the original result of the integrated methodology. For the remaining twenty eight cases, alternative (A2) has the highest priority in all cases.

Moreover, the results of the sensitivity analysis indicate that the alternatives' ranking has changed significantly according to equal weights of the criteria. Therefore, it can be seen that, based on the evaluations obtained, this decision making process is relatively intensive to the criteria weights with A2 emerging as the winner of all the cases.

Table 5 demonstrates the results of 20 times testing and Table 6 shows the evaluation result of island selection. This system is tested by 411 users. For each user, sensitivity analysis is conducted by swapping the weight of criteria and then twenty-eight records are obtained. After 411 users tested the system, there were 11508 records in the system. In testing 349 records, 96.275% of records have reasonable results and in testing 581 records, 95.353% of records have reasonable results and then in testing 1075 records, 88% of records have reasonable results. In testing 2209 records, 87.234% of records have reasonable results and in testing 4093 records, 86% of records have reasonable results and then in testing 5835 records, 85.844% of records have reasonable results. In testing 10009 records, 88.410% of records have reasonable results and in testing 11508 records, 88.58% of records have reasonable results.

CONCLUSION

This system utilizes the fuzzy AHP to determine the criteria's weights. TOPSIS technique is then used to determine the location ranking. The process of fuzzy analytic hierarchy has been the topic of many study articles and has been practically helpful and the technique is criticized.

TABLEIII. DETAILS FOR SENSITIVITY ANALYSIS

C1C2	C1C3	C1C4	C1C5	C1C6	C1C7	C1C8	C2C3	C2C4	C2C5	C2C6	C2C7	C2C8	C3C4	C3C5	C3C6	C3C7	C3C8	C4C5	C4C6	C4C7	C4C8	C5C6	C5C7	C5C8	C6C7	C6C8	C7C8
7	9	3	5	1	7	5	5	1	1	3	3	1	1	3	6	4	1	3	4	4	5	8	6	4	3	7	5
9	7	3	5	1	7	5	5	1	1	3	3	1	1	3	6	4	1	3	4	4	5	8	6	4	3	7	5
3	9	7	5	1	7	5	5	1	1	3	3	1	1	3	6	4	1	3	4	4	5	8	6	4	3	7	5
5	9	3	7	1	7	5	5	1	1	3	3	1	1	3	6	4	1	3	4	4	5	8	6	4	3	7	5
1	9	3	5	7	7	5	5	1	1	3	3	1	1	3	6	4	1	3	4	4	5	8	6	4	3	7	5
7	9	3	5	1	7	5	5	1	1	3	3	1	1	3	6	4	1	3	4	4	5	8	6	4	3	7	5
5	9	3	5	1	7	7	5	1	1	3	3	1	1	3	6	4	1	3	4	4	5	8	6	4	3	7	5
5	9	3	5	1	7	5	7	1	1	3	3	1	1	3	6	4	1	3	4	4	5	8	6	4	3	7	5
1	9	3	5	1	7	5	5	7	1	3	3	1	1	3	6	4	1	3	4	4	5	8	6	4	3	7	5
1	9	3	5	1	7	5	5	1	7	3	3	1	1	3	6	4	1	3	4	4	5	8	6	4	3	7	5
3	9	3	5	1	5	1	5	1	1	7	3	1	1	3	6	4	1	3	4	4	5	8	6	4	3	7	5
.
5	9	3	5	1	7	5	5	1	1	3	3	1	1	3	6	4	1	3	4	4	5	8	6	4	3	7	7

TABLEIV. RESULTS OF SENSITIVITY ANALYSIS

Cases	Priority 1	Priority 2	Priority 3	Priority 4	Priority 5	Priority 6	Priority 7
Case 1(main)	Ko Chang	Phuket	Ko Pha Ngan	Ko Lipe	Ko Tao	Ko Samui	Ko Phi Phi
Case 2	Ko Chang	Phuket	Ko Pha Ngan	Ko Lipe	Ko Tao	Ko Samui	Ko Phi Phi
Case 3	Ko Chang	Phuket	Ko Pha Ngan	Ko Lipe	Ko Tao	Ko Samui	Ko Phi Phi
Case 4	Ko Chang	Phuket	Ko Pha Ngan	Ko Lipe	Ko Tao	Ko Samui	Ko Phi Phi
Case 5	Ko Chang	Phuket	Ko Pha Ngan	Ko Lipe	Ko Tao	Ko Samui	Ko Phi Phi
Case 6	Ko Chang	Phuket	Ko Pha Ngan	Ko Lipe	Ko Tao	Ko Samui	Ko Phi Phi
Case 7	Ko Chang	Phuket	Ko Pha Ngan	Ko Lipe	Ko Tao	Ko Samui	Ko Phi Phi
Case 8	Ko Chang	Phuket	Ko Pha Ngan	Ko Lipe	Ko Tao	Ko Samui	Ko Phi Phi
Case 9	Ko Chang	Phuket	Ko Lipe	Ko Pha Nang	Ko Samui	Ko Tao	Ko Phi Phi
Case 10	Ko Chang	Phuket	Ko Lipe	Ko Pha Nang	Ko Samui	Ko Tao	Ko Phi Phi
Case 11	Ko Chang	Ko Samui	Ko Pha Ngan	Ko Lipe	Phuket	Ko Tao	Ko Phi Phi
.
Case 28	Ko Chang	Phuket	Ko Lipe	Ko Pha Nang	Ko Tao	Ko Samui	Ko Phi Phi

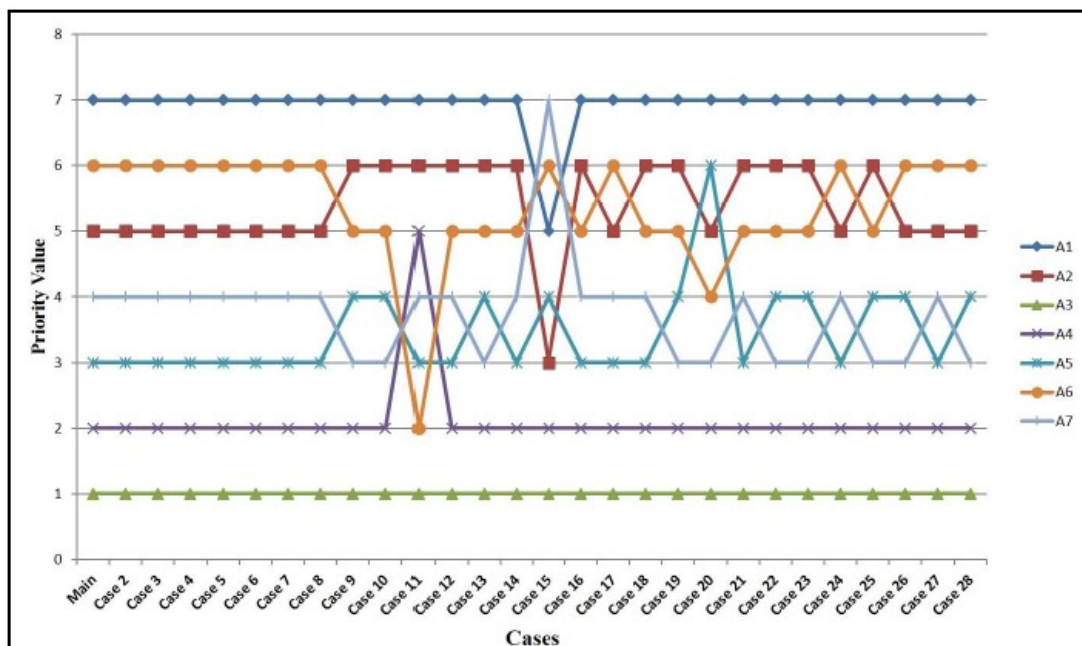
**Fig. 4: Sensitivity analysis under criteria weights**

TABLE V. THE RESULTS FOR 20 TIMES TESTING

ID	Country	Priority 1	User Preference	System Result	Remark
1	Thailand	Ko Chang(A3)	A3	A3	True
2	Thailand	Ko Chang(A3)	A3	A3	True
3	Thailand	Phuket(A4)	A1	A4	False
4	Thailand	Ko Pha Ngan(A5)	A5	A5	True
5	Thailand	Ko Tao(A2)	A2	A2	True
6	Malaysia	Palau Mabul(A6)	A6	A6	True
7	Malaysia	Pulau Pangkor(A1)	A1	A1	True
8	Malaysia	Redang(A7)	A7	A7	True
9	Malaysia	Pulau Tenggol(A4)	A4	A4	True
10	Malaysia	Penang(A3)	A4	A3	False
11	Cambodia	Koh Thmei(A6)	A6	A6	True
12	Cambodia	Koh Thmei(A6)	A6	A6	True
13	Cambodia	Koh Totang(A1)	A1	A1	True
14	Cambodia	Koh Rong(A3)	A3	A3	True
15	Cambodia	Koh Rong(A3)	A5	A3	False
16	Brunei	Solomon Island(A1)	A1	A1	True
17	Brunei	Mystical islands of Borneo(A4)	A4	A4	True
18	Brunei	Pulau Labuan(A3)	A3	A3	True
19	Brunei	Pulau Labuan(A3)	A3	A3	True
20	Brunei	Pulau Labuan(A3)	A3	A3	True

TABLE VI EVALUATION RESULT OF ISLAND SELECTION

Total Testing	Results
349	96.275%
581	95.353%
1075	88%
2209	87.234%
4093	86%
5835	85.844%
10009	88.410%
11508	88.58%

The user should use the process of the fuzzy analytical hierarchy and the TOPSIS method as just one element of user's overall build quality analysis. It is a precious addition to other objective and subjective methods that measure the value of the product. Generally, the user should not depend on any single quality metric or method of the software system.

The user can see how easy and powerful the technique is when used to monitor build quality. Furthermore, the user can use the technique in other areas. This is used for competitive analysis to assess the overall quality of the system relative to major competing systems. As the software development environment proceeds to mature, the approaches such as the process of fuzzy analytical hierarchy and TOPSIS will also become increasingly popular components of the software engineering skill set of the user.

This system, the triangular fuzzy numbers are utilized in establishing the pair-wise comparisons of criteria and alternatives through linguistic scales. FAHP is a reasonable approach to assessing complex multiple criteria and alternatives that involve subjective and unsure judgment.

TOPSIS is one of the well-known multi-criteria decision-making outranking techniques and can readily be used to rank options. Integrating FAHP and TOPSIS approaches allows specialists and users to easily search for particular purposes and requirements a more appropriate location. This system will assist individuals in choosing the correct place to travel.

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